

CLAIMS

What is claimed is:

- 1        1. A photodiode comprising:
  - 2            a silicon substrate of a first conductivity type having
  - 3            first and second surfaces;
  - 4            a region of a second conductivity type on the first
  - 5            surface of the substrate;
  - 6            a region of a first conductivity type on the second
  - 7            surface of the substrate, the region of a first conductivity
  - 8            type on the second surface of the substrate having a higher
  - 9            conductivity than the substrate;
  - 10          a patterned isolation layer on the region of a first
  - 11          conductivity type on the second surface of the substrate;
  - 12          and,
  - 13          a metal layer on the patterned isolation layer and
  - 14          contacting the region of a first conductivity type on the
  - 15          second surface of the substrate between regions of the
  - 16          patterned isolation layer.
- 1        2. The photodiode of claim 1 wherein pattern of the
- 2        patterned isolation layer is a repetitive pattern.
- 1        3. The photodiode of claim 2 wherein the isolation
- 2        layer is an oxide layer.

1       4. The photodiode of claim 2 wherein the isolation  
2 layer is a nitride layer.

1       5. The photodiode of claim 2 wherein the pattern is a  
2 repetitive pattern of rectangular regions.

1       6. The photodiode of claim 1 wherein the substrate is  
2 an n-type substrate.

1       7. The photodiode of claim 1 wherein the substrate is  
2 an p-type substrate.

1       8. The photodiode of claim 1 further comprised of an  
2 oxide layer over the region of a second conductivity type and  
3 surrounding substrate, and a patterned metal layer over the  
4 oxide layer and making electrical contact with the region of  
5 a second conductivity type through an opening in the oxide  
6 layer.

1       9. A method of forming a photodiode comprising:  
2           providing a silicon substrate of a first conductivity  
3 type having first and second surfaces;  
4           doping the second surface of the substrate to provide a  
5 layer of the first conductivity type of higher conductivity  
6 than the substrate and providing a layer of oxide thereover;

7       doping the first surface of the substrate to provide a  
8       layer of the second conductivity type and providing a layer  
9       of oxide thereover;

10       masking and etching the oxide layers on the first and  
11      second surfaces of the substrate to expose a contact region  
12      to the layer of the second conductivity type and to pattern  
13      the oxide layer on the second surface to expose a  
14      complementary pattern of the layer of the first conductivity  
15      type of higher conductivity than the substrate; and,  
16       providing a layer of metal on the second surface of the  
17      substrate and a patterned layer of metal on the first surface  
18      of the substrate.